

NASA/SP—2005-7039/SUPPL65  
January 2005

# **NASA PATENT ABSTRACTS BIBLIOGRAPHY**

A CONTINUING BIBLIOGRAPHY



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# Introduction

Several thousand inventions result each year from research supported by the National Aeronautics and Space Administration. NASA seeks patent protection on inventions to which it has title if the invention has important use in government programs or significant commercial potential. These inventions cover a broad range of technologies and include many that have useful and valuable commercial application.

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The *NASA Patent Abstracts Bibliography* is a semiannual NASA publication containing comprehensive abstracts of NASA-owned inventions covered by U.S. patents. The citations included were originally published in NASA's *Scientific and Technical Aerospace Reports (STAR)* and cover *STAR* announcements made since May 1969.

The citations published in this issue cover the period July 2004 through December 2004. The range of subjects covered includes the NASA Scope and Subject Category Guide's 10 broad subject divisions separated further into 76 specific categories. However, not all categories have citations during the dates covered for this issue, therefore the Table of Contents does not include all divisions and categories. This scheme was devised in 1975 and revised in 1987 and 2000 in lieu of the 34 category divisions which were utilized in supplements (01) through (06) covering *STAR* abstracts from May 1969 through January 1974. Each entry consists of a citation accompanied by an abstract and, when appropriate, a key illustration taken from the patent or application for patent. Entries are arranged by subject category in ascending order.

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### Patent Availability

How to obtain copies of NASA patents.

### Licenses for Commercial Use

Information on obtaining a license to use a NASA patented invention.

### Address of NASA Patent Counsels

Addresses for the NASA center patent counsels having knowledge of the invention.

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# Table of Contents

## Subject Divisions/Categories

Document citations are grouped by division and then by category, according to the *NASA Scope and Coverage Category Guide*.

### Aeronautics

03	Air Transportation and Safety .....	1
----	-------------------------------------	---

### Astronautics

20	Spacecraft Propulsion and Power .....	2
----	---------------------------------------	---

### Chemistry and Materials

23	Chemistry and Materials (General) .....	2
24	Composite Materials .....	4
26	Metals and Metallic Materials .....	4

### Engineering

33	Electronics and Electrical Engineering .....	5
34	Fluid Mechanics and Thermodynamics .....	8
35	Instrumentation and Photography .....	9
37	Mechanical Engineering .....	14
38	Quality Assurance and Reliability .....	16

### Life Sciences

51	Life Sciences (General) .....	17
52	Aerospace Medicine .....	19

### Mathematical and Computer Sciences

61	Computer Programming and Software .....	19
----	---	----

### Physics

74	Optics .....	21
76	Solid-State Physics .....	22

### Indexes

Two indexes are available. You may use the find command under the tools menu while viewing the PDF file for direct match searching on any text string. You may also select either of the two indexes provided for linking to the corresponding document citation from *NASA Thesaurus* terms and personal author names.

[Subject Term Index](#)

[Personal Author Index](#)

# NASA PATENT ABSTRACTS BIBLIOGRAPHY

*A Continuing Bibliography (Suppl. 65)*

JANUARY 2005

## 03

### AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; airport ground operations; flight safety and hazards; and aircraft accidents. Systems and hardware specific to ground operations of aircraft and to airport construction are covered in *09 Research and Support Facilities (Air)*. Air traffic control is covered in *04 Aircraft Communications and Navigation*. For related information see also *16 Space Transportation and Safety* and *85 Technology Utilization and Surface Transportation*.

**20040120989** NASA Marshall Space Flight Center, Huntsville, AL, USA

#### Article Screening System

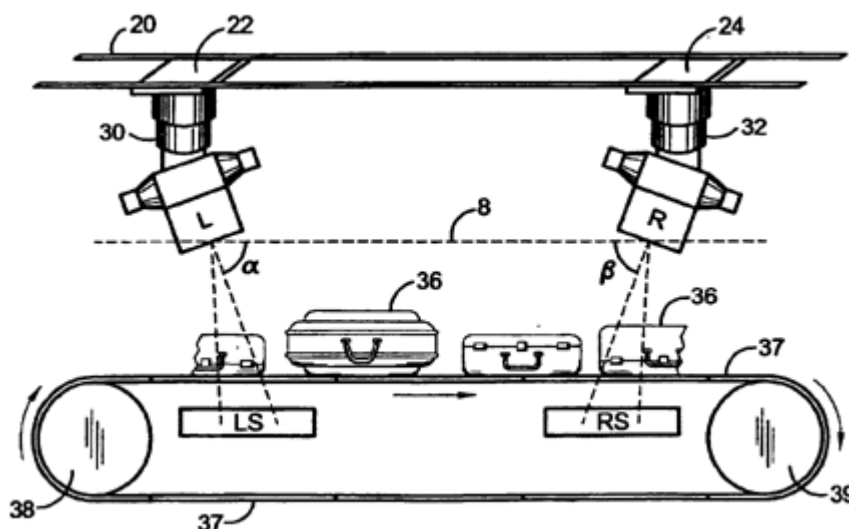
Fernandez, Kenneth R., Inventor; July 13, 2004; 8 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 30 Aug. 2002; US-Patent-6,763,083; US-Patent-Appl-SN-232937; NASA-Case-MFS-31783-1; No Copyright; Avail: CASI; [A02](#), Hardcopy

During the last ten years patents directed to luggage scanning apparatus began to appear in the patent art. Absent from the variety of approaches in the art is stereoscopic imaging that entails exposing two or more images of the same object, each taken from a slightly different perspective. If the perspectives are too different, that is, if there is too much separation of the X-ray exposures, the image will look flat. Yet with a slight separation, a stereo separation, interference occurs. Herein a system is provided for the production of stereo pairs. One perspective, a left or a right perspective angle, is first established. Next, the other perspective angle is computed. Using these left and right perspectives the X-ray sources can then be spaced away from each other.

Author

*Baggage; Imaging Techniques; Stereoscopy; X Ray Imagery*



## SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources. For related information see also *07 Aircraft Propulsion and Power*, *28 Propellants and Fuels*, *15 Launch Vehicles and Launch Operations*, and *44 Energy Production and Conversion*.

**20040120977** NASA Glenn Research Center, Cleveland, OH, USA

### Method for Forming MEMS-Based Spinning Nozzle

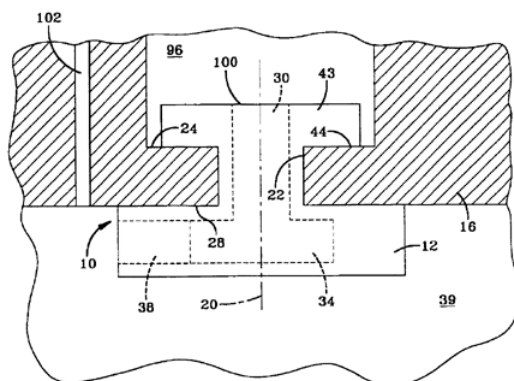
Okojie, Robert S., Inventor; August 03, 2004; 9 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 13 Aug. 2002; US-Patent-6,770,208; US-Patent-Appl-SN-219385; US-Patent-Appl-SN-816722; NASA-Case-LEW-17110-2; No Copyright; Avail: CASI; A02, Hardcopy

A nozzle body and assembly for delivering atomized fuel to a combustion chamber. The nozzle body is rotatably mounted onto a substrate. One or more curvilinear fuel delivery channels are in flow communication with an internal fuel distribution cavity formed in the nozzle body. Passage of pressurized fuel through the nozzle body causes the nozzle body to rotate. Components of the nozzle assembly are formed of silicon carbide having surfaces etched by deep reactive ion etching utilizing MEMS technology. A fuel premix chamber is carried on the substrate in flow communication with a supply passage in the nozzle body.

Author

*Fabrication; Spray Nozzles; Microelectromechanical Systems; Fuel Injection; Atomizers; Fuel Sprays*



## CHEMISTRY AND MATERIALS (GENERAL)

Includes general research topics related to the composition, properties, structure, and use of chemical compounds and materials as they relate to aircraft, launch vehicles, and spacecraft. For specific topics in chemistry and materials see *categories 25 through 29*. For astrochemistry see category *90 Astrophysics*.

**20040120974** NASA Langley Research Center, Hampton, VA, USA

### Heat, Moisture and Chemical Resistant Polyimide Compositions and Methods for Making and Using Them

Pater, Ruth H., Inventor; August 17, 2004; 12 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 1 Apr. 2002; US-Patent-6,777,525; US-Patent-Appl-SN-115812; US-Patent-Appl-SN-303741; NASA-Case-LAR-16311-1; No Copyright; Avail: CASI; A03, Hardcopy

Polyimides having a desired combination of high thermo-oxidative stability, low moisture absorption and excellent chemical and corrosion resistance are prepared by reacting a mixture of compounds including (a) 3,3',4,4'-benzophenonetetracarboxylic dianhydride (BTDA), (b) 3,4'-oxydianiline (3,4'-ODA), and (c) 5-norbornene-2,3-dicarboxylic anhydride (NA) in a high boiling, aprotic solvent to give 5 to 35% by weight of polyamic acid solution. The ratio of (a), (b), and (c) is selected to afford a family of polyimides having different molecular weights and properties. The mixture first forms a polyamic acid precursor. Upon heating at or above 300 C, the polyamic acids form polyimides, which are particularly suitable for use as a high temperature coating, adhesive, thin film, or composite matrix resin.

Author

*Synthesis (Chemistry); Polyimides*

**20040120975** NASA Marshall Space Flight Center, Huntsville, AL, USA

**Dual Use Corrosion Inhibitor and Penetrant for Anomaly Detection in Neutron/X Radiography**

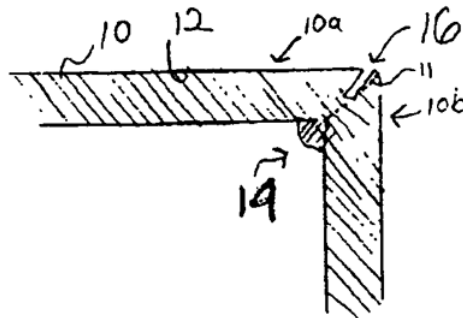
Hall, Phillip B., Inventor; Novak, Howard L., Inventor; August 17, 2004; 5 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 27 Nov. 2001; US-Patent-6,777,238; US-Patent-Appl-SN-011228; NASA-Case-MFS-31562-1; No Copyright; Avail: CASI; [A01](#), Hardcopy

A dual purpose corrosion inhibitor and penetrant composition sensitive to radiography interrogation is provided. The corrosion inhibitor mitigates or eliminates corrosion on the surface of a substrate upon which the corrosion inhibitor is applied. In addition, the corrosion inhibitor provides for the attenuation of a signal used during radiography interrogation thereby providing for detection of anomalies on the surface of the substrate.

Author

*Corrosion Prevention; Penetrants; Radiography; Coatings*



**20040121007** NASA Glenn Research Center, Cleveland, OH, USA

**Multilayer Article Characterized by Low Coefficient of Thermal Expansion Outer Layer**

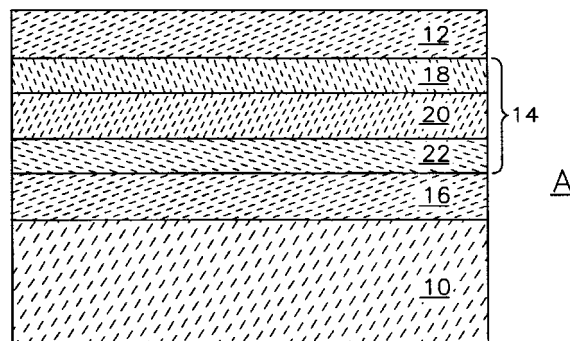
Lee, Kang N., Inventor; July 06, 2004; 18 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 22 May 2002; US-Patent-6,759,151; US-Patent-Appl-SN-154526; NASA-Case-LEW-17275-1; No Copyright; Avail: CASI; [A03](#), Hardcopy

A multilayer article comprises a substrate comprising a ceramic or a silicon-containing metal alloy. The ceramic is a Si-containing ceramic or an oxide ceramic with or without silicon. An outer layer overlies the substrate and at least one intermediate layer is located between the outer layer and the substrate. An optional bond layer is disposed between the at least one intermediate layer and the substrate. The at least one intermediate layer may comprise an optional chemical barrier layer adjacent the outer layer, a mullite-containing layer and an optional chemical barrier layer adjacent to the bond layer or substrate. The outer layer comprises a compound having a low coefficient of thermal expansion selected from one of the following systems: rare earth (RE) silicates; at least one of hafnia and hafnia-containing composite oxides; zirconia-containing composite oxides and combinations thereof.

Author

*Thermal Expansion; Barrier Layers; Silicates; Zirconium Oxides*



## COMPOSITE MATERIALS

Includes physical, chemical, and mechanical properties of laminates and other composite materials.

**20040120980** NASA Kennedy Space Center, Cocoa Beach, FL, USA

### **Ferromagnetic Conducting Lignosulfonic Acid-doped Polyaniline Nanocomposites**

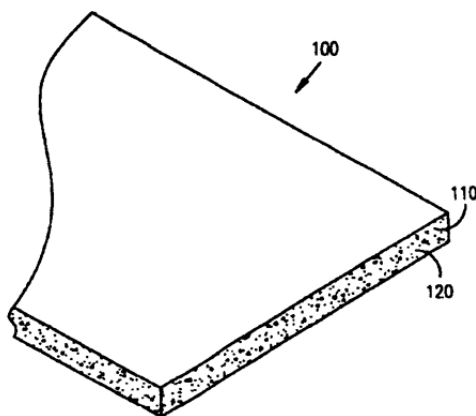
Viswanathan, Tito, Inventor; Berry, Brian, Inventor; July 20, 2004; 13 pp.; In English

Patent Info.: Filed 16 Nov. 2001; US-Patent-6,764,617; US-Patent-Appl-SN-994996; US-Patent-Appl-SN-249563; NASA-Case-KSC-12190-1; No Copyright; Avail: CASI; [A03](#), Hardcopy

A conductive ferromagnetic composition of matter comprising sulfonated lignin or a sulfonated polyflavonoid, or derivatives thereof, and ferromagnetic iron oxide particles is disclosed. Among the uses of the composition is to shield electromagnetic radiation. The ferromagnetic iron oxide particles of the composition are surprisingly stable to acid, and are easily and inexpensively formed from iron cations in solution.

Author

*Nanocomposites; Ferromagnetic Materials; Sulfonic Acid*



## METALS AND METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals and metallic materials; and metallurgy.

**20040121004** NASA Langley Research Center, Hampton, VA, USA

### **Process for Coating Substrates with Catalytic Materials**

Klelin, Ric J., Inventor; Upchurch, Billy T., Inventor; Schryer, David R., Inventor; June 22, 2004; 6 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 30 Jun. 2000; US-Patent-6,753,293; US-Patent-Appl-SN-607211; No Copyright; Avail: CASI; [A02](#), Hardcopy

A process for forming catalysts by coating substrates with two or more catalytic components, which comprises the following sequence of steps. First, the substrate is infused with an adequate amount of solution having a starting material comprising a catalytic component precursor, wherein the thermal decomposition product of the catalytic component precursor is a catalytic component. Second, the excess of the solution is removed from the substrate, thereby leaving a coating of the catalytic component precursor on the surface of the substrate. Third, the coating of the catalytic component precursor is converted to the catalytic component by thermal decomposition. Finally, the coated substance is etched to increase the surface area. The list three steps are then repeated for at least a second catalytic component. This process is ideally suited for application in producing efficient low temperature oxidation catalysts.

Author

*Catalysts; Coating; Substrates*

## ELECTRONICS AND ELECTRICAL ENGINEERING

Includes development, performance, and maintainability of electrical/electronic devices and components; related test equipment; and microelectronics and integrated circuitry. for related information see also 60 *Computer Operations and Hardware*; and 76 *Solid-State Physics*. For communications equipment and devices see 32 *Communications and Radar*.

**20040081216** NASA Langley Research Center, Hampton, VA, USA

**Synchronized Electronic Shutter System and Method for Thermal Nondestructive Evaluation**

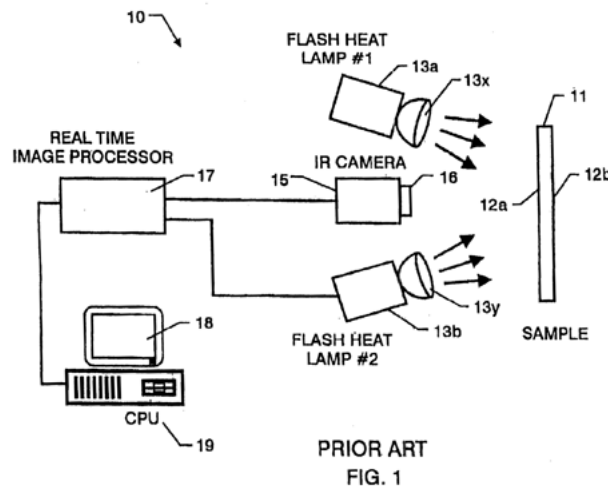
Zalameda, Joseph N., Inventor; Winfree, William P., Inventor; March 30, 2004; 28 pp.; In English

Patent Info.: Filed 10 Apr. 2002; US-Patent-6,712,502; US-Patent-Appl-SN-120225; NASA-Case-LAR-16126-1; No Copyright; Avail: CASI; A03, Hardcopy

The invention is a synchronized electronic shutter system (SESS) and method for same side and through transmission thermal analysis and inspection of a material for finding defects, corrosion, disbond defects, integrity of a weld and determination of paint thickness. The system comprises an infrared detector that acquires background images of the sample. A shutter then covers the detector and lamps rapidly heat the sample above ambient temperature. Shutters cover all lamps at the same time the shutter over the infrared detector is opened. The infrared detector acquires a series of temperature images over time radiated from the sample as the sample cools down. After collecting a series of temperature images taken by the SESS, a processed image is developed using one of the group comprising time derivative calculation, temperature normalization data reduction routine, thermal diffusivity curve fitting and averaging the series of temperature images.

Author

*Synchronizers; Shutters; Nondestructive Tests; Thermal Analysis*



**20040120978** NASA Glenn Research Center, Cleveland, OH, USA

**Multi-Functional, Micro Electromechanical Silicon Carbide Accelerometer**

Okojie, Robert S., Inventor; August 03, 2004; 39 pp.; In English; Original contains black and white illustrations

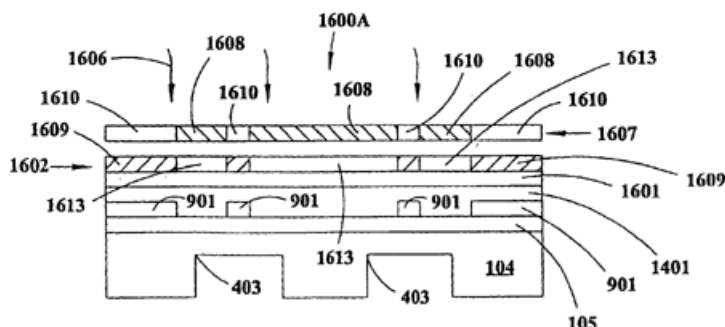
Patent Info.: Filed 24 Sep. 2003; US-Patent-6,769,303; US-Patent-Appl-SN-669587; US-Patent-Appl-SN-124689; NASA-Case-LEW-17170-2; No Copyright; Avail: CASI; A03, Hardcopy

A method of bulk manufacturing SiC sensors is disclosed and claimed. Materials other than SiC may be used as the substrate material. Sensors requiring that the SiC substrate be pierced are also disclosed and claimed. A process flow reversal is employed whereby the metallization is applied first before the recesses are etched into or through the wafer. Aluminum is deposited on the entire planar surface of the metallization. Photoresist is spun onto the substantially planar surface of the Aluminum which is subsequently masked (and developed and removed). Unwanted Aluminum is etched with aqueous TMAH and subsequently the metallization is dry etched. Photoresist is spun onto the still substantially planar surface of Aluminum and oxide and then masked (and developed and removed) leaving the unimidized photoresist behind. Next, ITO is applied over the still substantially planar surface of Aluminum, oxide and unimidized photoresist. Unimidized and exposed photoresist and ITO directly above it are removed with Acetone. Next, deep reactive ion etching attacks exposed oxide not protected by ITO.

Finally, hot phosphoric acid removes the Al and ITO enabling wires to connect with the metallization. The back side of the SiS wafer may be also etched.

Official Gazette of the U.S. Patent and Trademark Office

*Accelerometers; Silicon Carbides; Microelectromechanical Systems; Manufacturing*



**20040120984** NASA Pasadena Office, CA, USA

#### **Method for Manufacturing Thin-film Lithium Microbatteries**

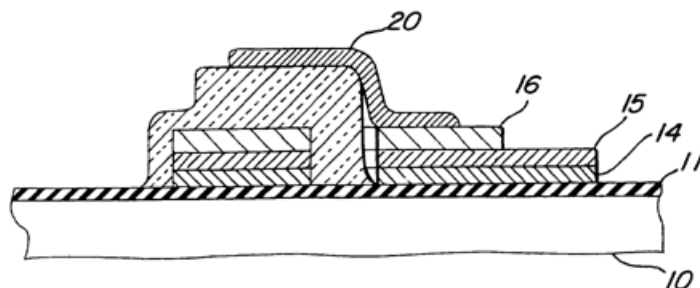
Whitacre, Jay F., Inventor; Bugga, Ratnakumar V., Inventor; West, William C., Inventor; July 20, 2004; 14 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 11 Mar. 2003; US-Patent-6,764,525; US-Patent-Appl-SN-390258; US-Patent-Appl-SN-779595; NASA-Case-NPO-21015-2-CU; No Copyright; Avail: CASI; [A03](#), Hardcopy

A process for making thin-film batteries including the steps of cleaning a glass or silicon substrate having an amorphous oxide layer several microns thick; defining with a mask the layer shape when depositing cobalt as an adhesion layer and platinum as a current collector; using the same mask as the preceding step to sputter a layer of LiCoO<sub>2</sub> on the structure while rocking it back and forth; heating the substrate to 300 C. for 30 minutes; sputtering with a new mask that defines the necessary electrolyte area; evaporating lithium metal anodes using an appropriate shadow mask; and, packaging the cell in a dry-room environment by applying a continuous bead of epoxy around the active cell areas and resting a glass slide over the top thereof.

Official Gazette of the U.S. Patent and Trademark Office

*Thin Films; Lithium Batteries; Manufacturing*



**20040120995** NASA Pasadena Office, CA, USA

#### **Protective Fullerene (C60) Packaging System for Microelectromechanical Systems Applications**

Olivas, John D., Inventor; September 14, 2004; 7 pp.; In English; Original contains black and white illustrations

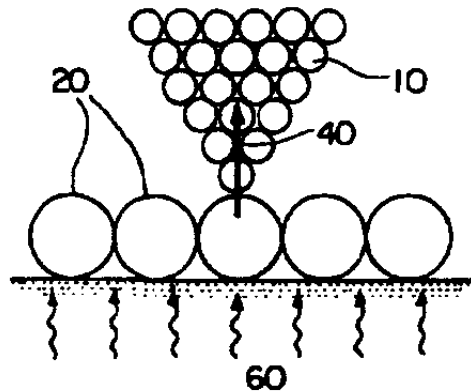
Patent Info.: Filed 20 Jun. 2001; US-Patent-6,791,108; US-Patent-Appl-SN-888631; US-Patent-Appl-SN-310774; NASA-Case-NPO-20148-2; No Copyright; Avail: CASI; [A02](#), Hardcopy

The invention involves tunneling tips to their conducting surface, and specifically the deposition of a monolayer of fullerene C<sub>60</sub> onto the conducting plate surface to protect the tunneling tip from contact. The Fullerene C<sub>60</sub> molecule is approximately spherical, and a monolayer of fullerene has a thickness of one nanometer, such that a monolayer thereby establishing the theoretical distance desired between the MEMS tunneling tip and the conducting plate. Exploiting the electrical conductivity of C<sub>60</sub> the tip can be accurately positioned by simply monitoring conductivity between the fullerene and the tunneling tip. By monitoring the Conductivity between the tip and the fullerene layer as the tip is brought in proximity, the surfaces can be brought together without risk of contacting the underlying conducting surface. Once the tunneling tip is

positioned at the one nanometer spacing, with only the monolayer of fullerene between the tunneling tip and the conducting plate, the monolayer of C60, can be broken down thermally and removed chemically leaving only the tunneling tip and the conducting plate at the ideal tunneling spacing. Alternatively, the properties of fullerene allow the tunneling process to occur directly across the fullerene monolayer.

Official Gazette of the U.S. Patent and Trademark Office

*Fullerenes; Microelectromechanical Systems; Packaging*



**20040121000** NASA Marshall Space Flight Center, Huntsville, AL, USA

#### **Cross Cell Sandwich Core**

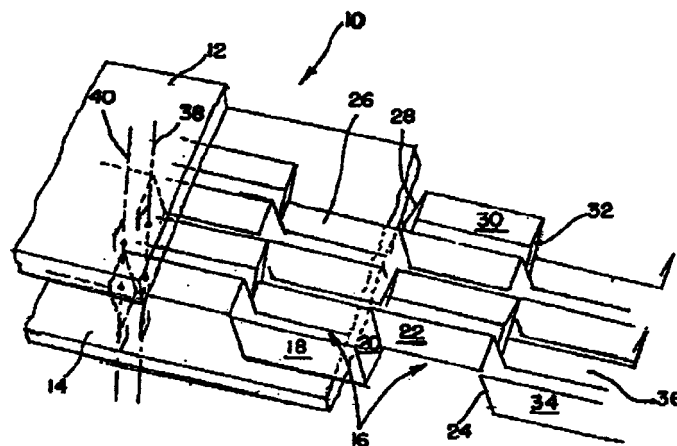
Ford, Donald B., Inventor; June 08, 2004; 5 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 6 Aug. 2001; US-Patent-6,745,662; US-Patent-Appl-SN-922169; NASA-Case-MFS-31613-1; No Copyright; Avail: CASI; [A01](#), Hardcopy

A sandwich core comprises two faceplates separated by a plurality of cells. The cells are comprised of walls positioned at oblique angles relative to a perpendicular axis extending through the faceplates. The walls preferably form open cells and are constructed from open cells and are constructed from rows of ribbons. The walls may be obliquely angled relative to more than one plane extending through the perpendicular axis.

Author

*Walls; Electrolytic Cells*



**20040121002** NASA Pasadena Office, CA, USA

#### **Very High Efficiency, Miniaturized, Long-Lived Alpha Particle Power Source Using Diamond Devices for Extreme Space Environments**

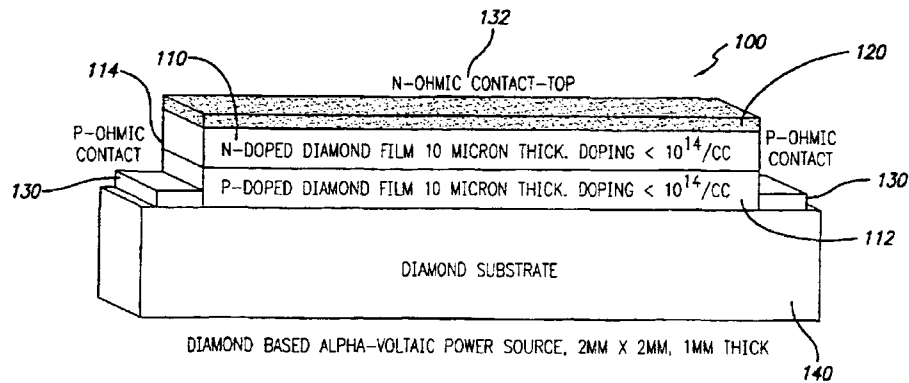
Kolawa, Elizabeth A., Inventor; Patel, Jagdishbhai U., Inventor; Fleurial, Jean-Pierre, Inventor; June 22, 2004; 6 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 5 Aug. 2002; US-Patent-6,753,469; US-Patent-Appl-SN-214486; NASA-Case-NPO-30323; No Copyright; Avail: CASI; [A02](#), Hardcopy

A power source that converts a-particle energy into electricity by coulomb collision in doped diamond films is described. Alpha particle decay from curium-244 creates electron-hole pairs by free- ing electrons and holes inside the crystal lattice in N- and P-doped diamond films. Ohmic contacts provide electrical connection to an electronic device. Due to the built-in electric field at the rectifying junction across the hT- and P-doped diamond films, the free electrons are constrained to traveling in generally one direction. This one direction then supplies electrons in a manner similar to that of a battery. The radioactive curium layer may be disposed on diamond films for even distribution of a-particle radiation. The resulting power source may be mounted on a diamond substrate that serves to insulate structures below the diamond substrate from a-particle emission. Additional insulation or isolation may be provided in order to prevent damage from a-particle collision. N-doped silicon may be used instead of N-doped diamond.

Author

*Alpha Particles; Diamond Films; Electric Power Supplies*



### 34

## FLUID MECHANICS AND THERMODYNAMICS

Includes fluid dynamics and kinematics and all forms of heat transfer; boundary layer flow; hydrodynamics; hydraulics; fluidics; mass transfer and ablation cooling. For related information see also *02 Aerodynamics*.

**20040081214** NASA Kennedy Space Center, Cocoa Beach, FL, USA

### Apparatus and Method for Thermal Performance Testing of Pipelines and Piping Systems

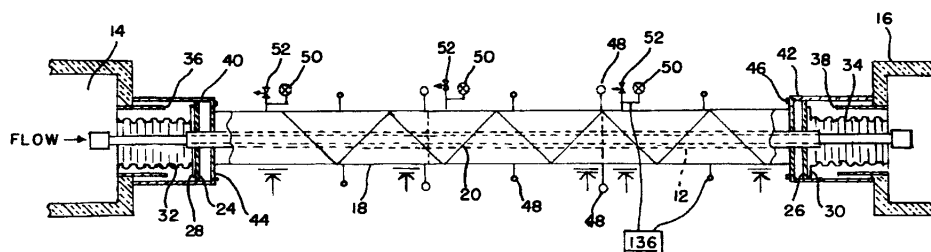
Fesmire, James E., Inventor; Nagy, Zeltan F., Inventor; Augustynowicz, Stanislaw D., Inventor; April 06, 2004; 8 pp.; In English

Patent Info.: Filed 26 Jun. 2002; US-Patent-6,715,914; US-Patent-Appl-SN-185378; NASA-Case-KSC-12205; No Copyright; Avail: CASI; [A02](#), Hardcopy

A test apparatus and method of its use for evaluating various performance aspects of a piping segment locates a piping segment between two cold boxes. A first cold box conditions test fluid before providing the fluid into the piping segment- The first and second cold boxes both significantly reduce, if not eliminate, any heat transfer from the ends of the piping so that accurate measurements of heat leak rates from the sides of the piping segment may be determined.

Author

*Performance Tests; Pipelines; Heat Transfer*



**20040081215** NASA Langley Research Center, Hampton, VA, USA

**Self-Activating System and Method for Alerting When an Object or a Person is Left Unattended**

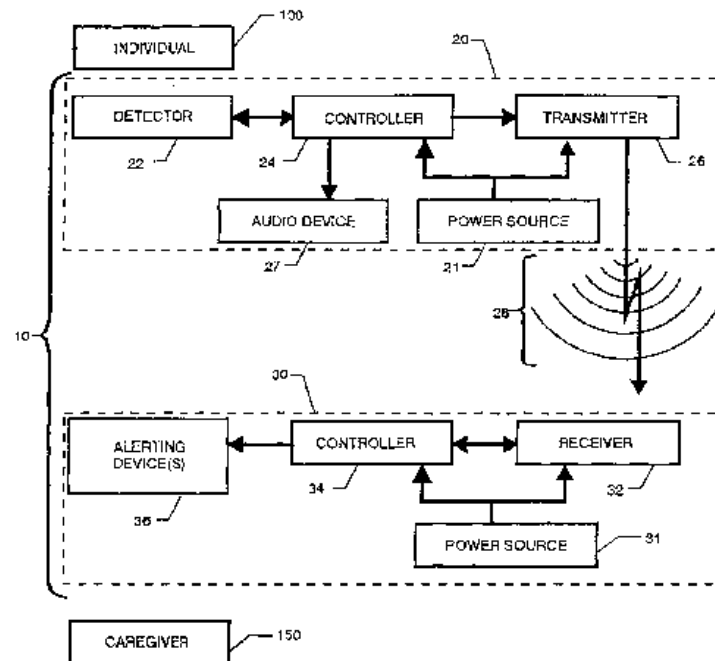
Edwards, William Christopher, Inventor; Mack, Terry L., Inventor; Modlin, Edward A., Inventor; March 30, 2004; 22 pp.; In English

Patent Info.: Filed 27 Nov. 2001; US-Patent-6,714,132; US-Patent-Appl-SN-011229; US-Patent-Appl-SN-329692; NASA-Case-LAR-16324-1; No Copyright; Avail: CASI; [A03](#), Hardcopy

A system and method uses a wireless tether comprising a transmitter and a receiver to alert a caregiver that an object or person has been left unattended. A detector senses the presence of the object, usually a child, located in a position such as a safety seat. The detector couples to the transmitter, which is located near the object. The transmitter transmits at least one wireless signal when the object is in the position. The receiver, which is remotely located from the transmitter, senses the at least one signal as long as the receiver is within a prescribed range of transmission. By performing a timing function, the receiver monitors the proximity of the caregiver, who maintains possession of the receiver, to the transmitter. The system communicates an alarm to the caregiver when the caregiver ventures outside the range of transmission without having removed the object/child from the position.

Author

*Warning Systems; Monitors; Safety*



**35**

**INSTRUMENTATION AND PHOTOGRAPHY**

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography. For aerial photography see *43 Earth Resources and Remote Sensing*. For related information see also *06 Avionics and Aircraft Instrumentation*; and *19 Spacecraft Instrumentation and Astrionics*.

**20040120979** NASA Langley Research Center, Hampton, VA, USA

**Multi-Element Electron-Transfer Optical Detector System**

Jordan, Jeffrey D., Inventor; July 20, 2004; 6 pp.; In English; Original contains black and white illustrations

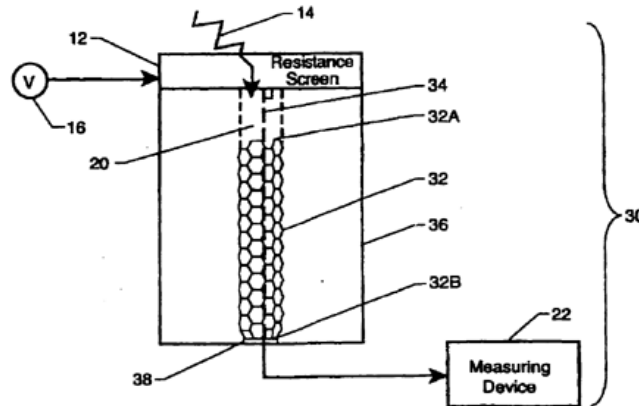
Patent Info.: Filed 13 Mar. 2002; US-Patent-6,765,190; US-Patent-Appl-SN-097699; US-Patent-Appl-SN-276568; NASA-Case-LAR-16279-2; No Copyright; Avail: CASI; [A02](#), Hardcopy

A multi-element optical detector system includes an electrically resistive screen that is substantially transparent to radiation energy having a wavelength of interest. A plurality of electron transfer elements (e.g., a low work function photoactive material or a carbon nanotube (CNT)-based element) are provided with each having a first end and a second end. The first end of each element is spaced apart from the screen by an evacuated gap. When the radiation energy passes through

the screen with a bias voltage applied thereto, transfer of electrons through each element is induced from the first end to the second end such that a quantity indicative of the electrons transferred through each element can be detected.

Author

*Optical Equipment; Radiation Detectors; Electron Transfer*



**20040120991** NASA Langley Research Center, Hampton, VA, USA

# **Method and Apparatus for Non-Invasive Measurement of Changes in Intracranial Pressure**

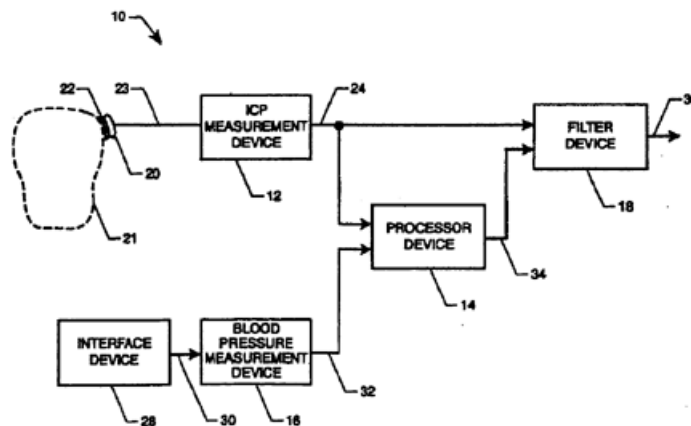
Yost, William T., Inventor; Cantrell, John H., Jr., Inventor; July 13, 2004; 9 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 7 Mar, 2002; US-Patent-6,761,695; US-Patent-Appl-SN-094,023; NASA-Case-LAR-15854-1; No Copyright; Avail: CASI; [A02](#), Hardcopy

A method and apparatus for measuring intracranial pressure. In one embodiment, the method comprises the steps of generating an information signal that comprises components (e.g., pulsatile changes and slow changes) that are related to intracranial pressure and blood pressure, generating a reference signal comprising pulsatile components that are solely related to blood pressure, processing the information and reference signals to determine the pulsatile components of the information signal that have generally the same phase as the pulsatile components of the reference signal, and removing from the information signal the pulsatile components determined to have generally the same phase as the pulsatile components of the reference signal so as to provide a data signal having components wherein substantially all of the components are related to intracranial pressure.

Author

*Intracranial Pressure; Pressure Measurement; Noninvasive Measurement; Medical Equipment*



**20040120993** NASA Kennedy Space Center, Cocoa Beach, FL, USA

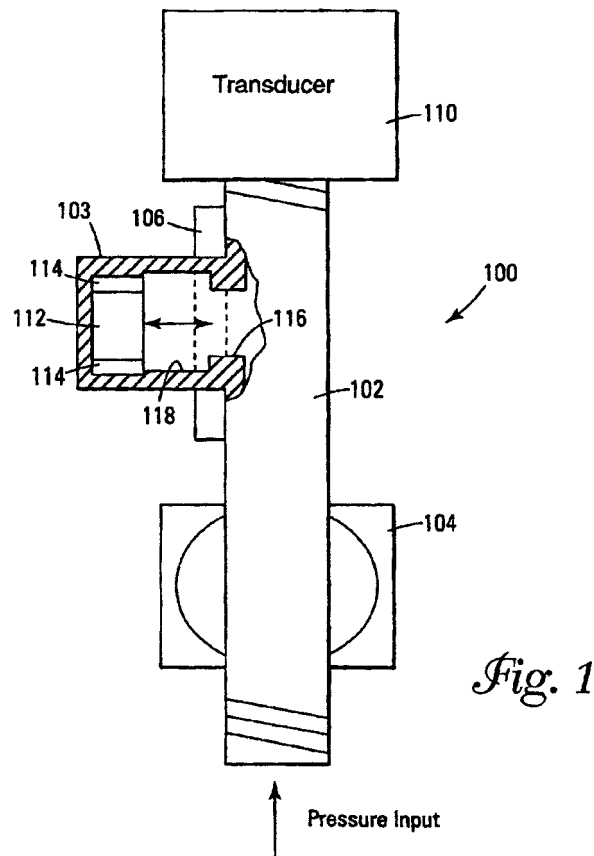
**Thermodynamic Pressure/Temperature Transducer Health Check**

Immer, Christopher D., Inventor; Eckhoff, Anthony, Inventor; Medelius, Pedro J., Inventor; Deyoe, Richard T., Inventor; Starr, Stanley O., Inventor; August 31, 2004; 14 pp.; In English; Original contains black and white illustrations  
Patent Info.: Filed 9 Nov. 2001; US-Patent-6,782,753; US-Patent-Appl-SN-994990; US-Patent-Appl-SN-247848; NASA-Case-KSC-12139-1; No Copyright; Avail: CASI; A03, Hardcopy

A device and procedure for checking the health of a pressure transducer in situ is provided. The procedure includes measuring a fixed change in pressure above ambient pressure and a fixed change in pressure below ambient pressure. This is done by first sealing an enclosed volume around the transducer with a valve. A piston inside the sealed volume is increasing the pressure. A fixed pressure below ambient pressure is obtained by opening the valve, driving the piston. The output of the pressure transducer is recorded for both the overpressuring and the underpressuring. By comparing this data with data taken during a preoperative calibration, the health of the transducer is determined from the linearity, the hysteresis, and the repeatability of its output. The further addition of a thermometer allows constant offset error in the transducer output to be determined.

Official Gazette of the U.S. Patent and Trademark Office

*Thermodynamics; Pressure Sensors; Thermometers; Health*



**20040120997** NASA Glenn Research Center, Cleveland, OH, USA

**Rare Earth Optical Temperature Sensor**

Chubb, Donald L., Inventor; Jenkins, Phillip, Inventor; June 08, 2004; 4 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 1 Jun. 1999; US-Patent-6,746,149; US-Patent-Appl-SN-323650; NASA-Case-LEW-16682-1; No Copyright; Avail: CASI; A01, Hardcopy

A rare earth optical temperature sensor is disclosed for measuring high temperatures. Optical temperature sensors exist that channel emissions from a sensor to a detector using a light pipe. The invention uses a rare earth emitter to transform the

*Rare Earth Elements; Temperature Sensors; Optical Measuring Instruments; Manufacturing*

**20040121008** NASA Ames Research Center, Moffett Field, CA, USA

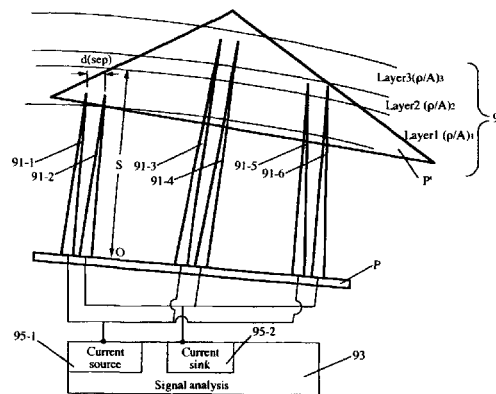
### Retinal Light Processing Using Carbon Nanotubes

Loftus, David J., Inventor; Leng, Theodore, Inventor; Fishman, Harvey, Inventor; June 29, 2004; 15 pp.; In English  
Patent Info.: Filed 16 Jul. 2002; US-Patent-6,755,530; US-Patent-Appl-SN-198672; NASA-Case-ARC-14941-1; No Copyright; Avail: CASI; A03, Hardcopy

Method and system for processing light signals received by the eye of a human or other animal, where the eye may be compromised or non-functioning. Incident light is received at first and second pixels in a photodetector array and provides a pixel electrical signal representing the received light. Each of an array of carbon nanotube (CNT) towers is connected to a pixel, has a first tower end penetrating a retinal active layer of the animal and has a second tower end positioned to receive and transport the pixel electrical signal to the retinal active layer. The CNT tower may be coated with a biologically active substance or chemically modified to promote neurite connections with the tower. The photoreceptor array can be provide with a signal altering mechanism that alters at least one of light intensity and wavelength intensity sensed by a first pixel relative to a second pixel, to correct for one or more selected eye problems.

Author

*Carbon Nanotubes; Enhanced Vision; Retina; Bioinstrumentation*



**20040121125** NASA Langley Research Center, Hampton, VA, USA

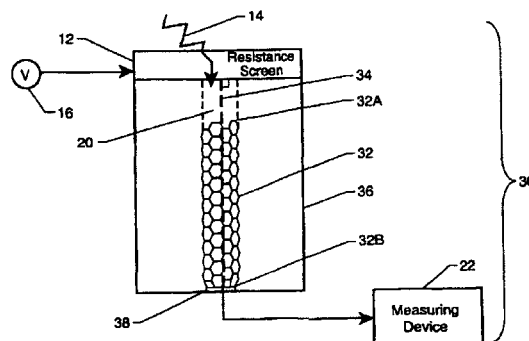
### Single-element Electron-transfer Optical Detector System

Jordan, Jeffrey D., Inventor; June 15, 2004; 12 pp.; In English; Original contains black and white illustrations  
Patent Info.: Filed 13 Mar. 2002; US-Patent-6,750,438; US-Patent-Appl-SN-097702; US-Patent-Appl-SN-276568; NASA-Case-LAR-16279-1; No Copyright; Avail: CASI; A03, Hardcopy

An optical detector system includes an electrically resistive screen that is substantially transparent to radiation energy having a wavelength of interest. An electron transfer element (e.g., a low work function photoactive material or a carbon nanotube (CNT)-based element) has a first end and a second end with its first end spaced apart from the screen by an evacuated gap. When radiation energy passes through the screen with a bias voltage being applied thereto, transfer of electrons through the electron transfer element is induced from its first to its second end such that a quantity indicative of the electrons transferred can be detected.

Author

*Electron Counters; Carbon Nanotubes; Electron Transfer*



**20040129681** NASA Marshall Space Flight Center, Huntsville, AL, USA

### **Video Image Tracking Engine**

Howard, Richard T., Inventor; Bryan, ThomasC., Inventor; Book, Michael L., Inventor; August 17, 2004; 9 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 28 Sep. 2001; US-Patent-6,778,180; US-Patent-Appl-SN-967833; NASA-Case-MFS-31525-1; No Copyright; Avail: CASI; [A02](#), Hardcopy

A method and system for processing an image including capturing an image and storing the image as image pixel data. Each image pixel datum is stored in a respective memory location having a corresponding address. Threshold pixel data is selected from the image pixel data and linear spot segments are identified from the threshold pixel data selected.. The positions of only a first pixel and a last pixel for each linear segment are saved. Movement of one or more objects are tracked by comparing the positions of first and last pixels of a linear segment present in the captured image with respective first and last pixel positions in subsequent captured images. Alternatively, additional data for each linear data segment is saved such as sum of pixels and the weighted sum of pixels i.e., each threshold pixel value is multiplied by that pixel's x-location).

Author

*Video Equipment; Image Processing; Video Data*

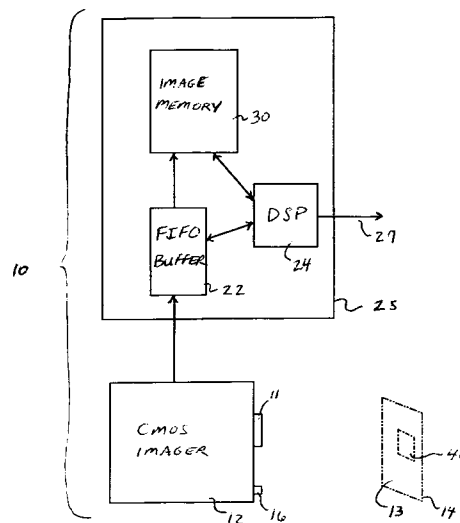


FIG. 2

37

### **MECHANICAL ENGINEERING**

Includes mechanical devices and equipment; machine elements and processes. For cases where the application of a device or the host vehicle is emphasized see also the specific category where the application or vehicle is treated. For robotics see *63 Cybernetics, Artificial Intelligence, and Robotics*; and *54 Man/System Technology and Life Support*.

**20040120988** NASA Glenn Research Center, Cleveland, OH, USA

### **Gas Sensors Using SiC Semiconductors and Method of Fabrication Thereof**

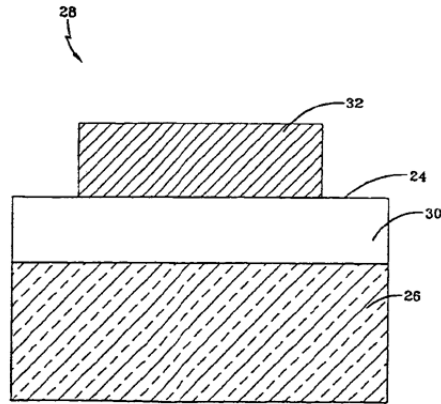
Hunter, Gary W., Inventor; Neudeck, Philip G., Inventor; July 20, 2004; 18 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 6 Feb. 2003; US-Patent-6,763,699; US-Patent-Appl-SN-359940; NASA-Case-LEW-17300-1; No Copyright; Avail: CASI; [A03](#), Hardcopy

Gas sensor devices are provided having an atomically flat silicon carbide top surface that, in turn, provides for a uniform, and reproducible surface thereof.

Official Gazette of the U.S. Patent and Trademark Office

*Fabrication; Gas Detectors; Semiconductors (Materials); Silicon Carbides*



**20040120992** NASA Glenn Research Center, Cleveland, OH, USA

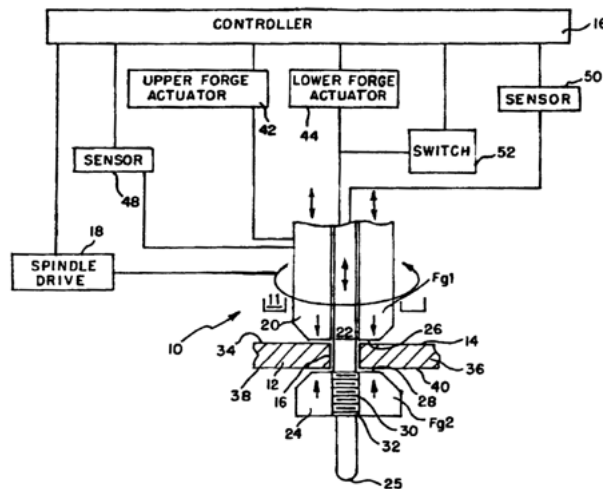
### Auto-Adjustable Tool for Self-Reacting and Conventional Friction Stir Welding

Carter, Robert W., Inventor; April 30, 2002; 6 pp.; In English; Original contains black and white illustrations  
 Patent Info.: Filed 2 May 2003; US-Patent-6,758,382; US-Patent-Appl-SN-431655; NASA-Case-LEW-16056-3  
 Report No.(s): SHINe; No Copyright; Avail: CASI; A02, Hardcopy

A friction stir welding device that is configured to perform convention friction stir welding as well as self-reacting friction stir welding is described. A pin passes hrough an upper shoulder and can selectively attach 10 and detach from a lower shoulder in a preferred embodiment. A controller maintains the discrete position of, and/or force applied by, the upper and lower shoulders during self-reacting friction stir welding, or maintains the pin at a desired depth and/or applied force during conventional friction stir welding.

Author

*Friction Stir Welding; Diagrams*



**20040120999** NASA Dryden Flight Research Center, Edwards, CA, USA

### Force-Measuring Clamp

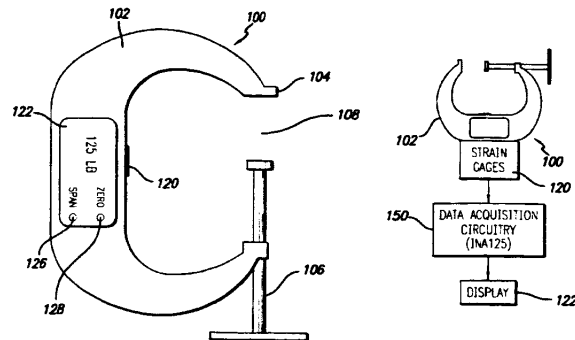
Nunnelee, Mark, Inventor; July 06, 2004; 10 pp.; In English; Original contains black and white illustrations  
 Patent Info.: Filed 20 Feb. 2002; US-Patent-6,758,098; US-Patent-Appl-SN-084747; NASA-Case-DRC-099037; No Copyright; Avail: CASI; A02, Hardcopy

A precision clamp that accurately measures force over a wide range of conditions is described. Using a full bridge or other strain gage configuration, the elastic deformation of the clamp is measured or detected by the strain gages. The strain gages

transmit a signal that corresponds to the degree of stress upon the clamp. The strain gage signal is converted to a numeric display. Calibration is achieved by zero and span potentiometers which enable accurate measurements by the force-measuring clamp.

Author

*Strain Gages; Clamps*



38

### QUALITY ASSURANCE AND RELIABILITY

Includes approaches to, and methods for reliability analysis and control, quality control, inspection, maintainability, and standardization.

**20040081248** NASA Kennedy Space Center, Cocoa Beach, FL, USA

### Methods of Testing Thermal Insulation and Associated Test Apparatus

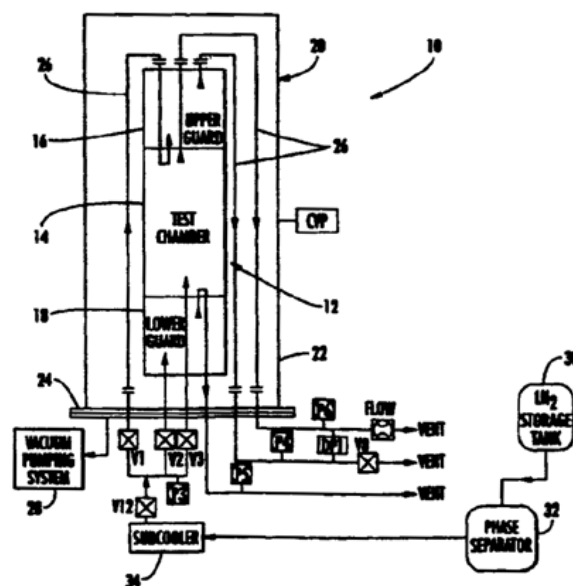
June 1, 2004; 15 pp.; In English

Patent Info.: Filed 10 Jul. 2001; US-Patent-6,742,926; US-Patent-Appl-SN-217121; NASA-Case-KSC-12107; No Copyright; Avail: CASI; A03, Hardcopy

The system and method for testing thermal insulation uses a cryostatic insulation tester having a vacuum chamber and a cold mass including a test chamber and upper and lower guard chambers adjacent thereto. The thermal insulation is positioned within the vacuum chamber and adjacent the cold mass. Cryogenic liquid is supplied to the test chamber, upper guard and lower guard to create a first gas layer in an upper portion of the lower guard chamber and a second gas layer in an upper portion of the test chamber. Temperature are sensed within the vacuum chamber to test the thermal insulation.

Author

*Thermal Insulation; Cryogenics*



## LIFE SCIENCES (GENERAL)

Includes general research topics related to plant and animal biology (non-human); ecology; microbiology; and also the origin, development, structure, and maintenance of animals and plants in space and related environmental conditions. For specific topics in life sciences see *categories 52 through 55*.

**20040081213** NASA Johnson Space Center, Houston, TX, USA

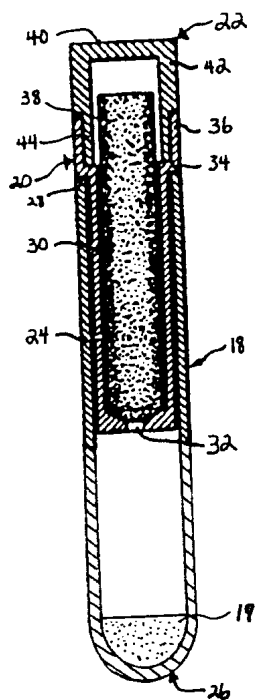
### Preservation of Liquid Biological Samples

Putch, Lakshmi, Inventor; Nimmagudda, Ramalingeshwara, Inventor; April 06, 2004; 12 pp.; In English  
 Patent Info.: Filed 28 Jul. 2000; US-Patent-6,716,392; US-Patent-Appl-SN-630979; US-Patent-Appl-SN-630979; US-Patent-Appl-SN-007239; NASA-Case-MSC-22616-3; No Copyright; Avail: CASI; [A03](#), Hardcopy

The present invention related to the preservation of a liquid biological sample. The biological sample is exposed to a preservative containing at least about 0.15 g of sodium benzoate and at least about 0.025 g of citric acid per 100 ml of sample. The biological sample may be collected in a vessel or an absorbent mass. The biological sample may also be exposed to a substrate and/or a vehicle.

Author

*Liquids; Biology; Samples; Preserving*



**20040081249** NASA Langley Research Center, Hampton, VA, USA

### Method and Apparatus for Determining Changes in Intracranial Pressure Utilizing Measurement of the Circumferential Expansion or Contraction of a Patient's Skull

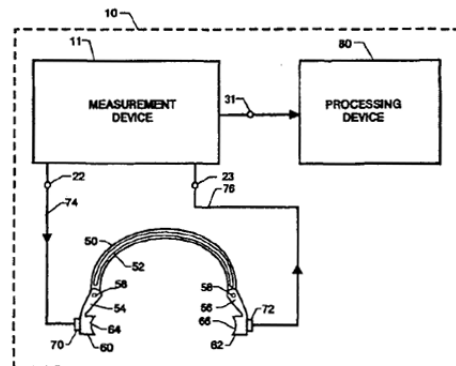
Yos, William T., Inventor; Cantrell, John H., Jr., Inventor; June 08, 2004; 6 pp.; In English  
 Patent Info.: Filed 4 Apr. 2002; US-Patent-6,746,410; US-Patent-Appl-SN-121932; US-Case-LAR-15943-1; No Copyright; Avail: CASI; [A02](#), Hardcopy

A method and apparatus for measuring changes in intracranial pressure (ICP) utilizing the variation of the surface wave propagation parameters of the patient's skull to determine the change in ICP. In one embodiment, the method comprises the steps of transmitting an ultrasonic bulk compressional wave onto the surface of the skull at a predetermined angle with respect to the skull so as to produce a surface wave, receiving the surface wave at an angle with respect to the skull which is substantially the same as the predetermined angle and at a location that is a predetermined distance from where the ultrasonic bulk compressional wave was transmitted upon the skull, determining the retardation or advancement in phase of the received surface wave with respect to a reference phase, and processing the determined retardation or advancement in phase to

determine circumferential expansion or contraction of the skull and utilizing the determined circumferential change to determine the change in intracranial pressure.

Author

*Compression Waves; Intracranial Pressure; Pressure Measurement*



**20040121001** NASA Langley Research Center, Hampton, VA, USA

### Passive Fetal Heart Monitoring System

Bryant, Timothy D., Inventor; Wynkoop, Mark W., Inventor; Holloway, Nancy M. H., Inventor; Zuckerwar, Allan J., Inventor; June 15, 2004; 28 pp.; In English; Original contains black and white illustrations  
 Patent Info.: Filed 13 Feb. 2001; US-Patent-6,749,573; US-Patent-Appl-SN-784414; US-Patent-Appl-SN-182344; NASA-Case-LAR-15602-1; No Copyright; Avail: CASI; [A03](#), Hardcopy

A fetal heart monitoring system preferably comprising a backing plate having a generally concave front surface and a generally convex back surface, and at least one sensor element attached to the concave front surface for acquiring acoustic fetal heart signals produced by a fetus within a body. The sensor element has a shape that conforms to the generally concave back surface of the backing plate. In one embodiment, the at least one sensor element comprises an inner sensor, and a plurality of outer sensors surrounding the inner sensor. The fetal heart monitoring system can further comprise a web belt, and a web belt guide movably attached to the web belt. The web belt guide being is to the convex back surface of the backing plate.

Author

*Heart; Monitors; Signal Transmission*

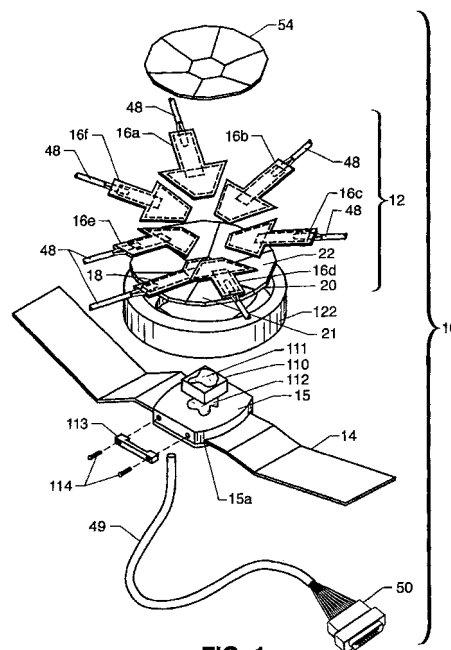


FIG. 1

## AEROSPACE MEDICINE

Includes the biological and physiological effects of atmospheric and space flight (weightlessness, space radiation, acceleration, and altitude stress) on the human being; and the prevention of adverse effects on those environments. For psychological and behavioral effects of aerospace environments, see *53 Behavioral Sciences*. For the effects of space on animals and plants see *51 Life Sciences*.

**20040120976** NASA Langley Research Center, Hampton, VA, USA

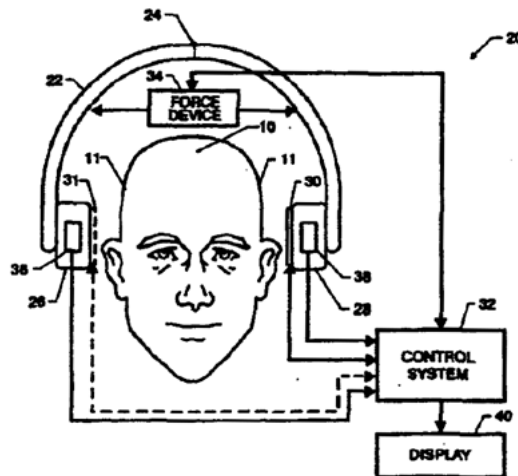
### Non-Invasive Method of Determining Absolute Intracranial Pressure

Yost, William T., Inventor; Cantrell, John H., Jr., Inventor; Hargens, Alan E., Inventor; August 10, 2004; 8 pp.; In English; Original contains black and white illustrations; US-Patent-6,773,407; US-Patent-Appl-SN-263286; US-Patent-Appl-SN-371601; NASA-Case-LAR-16510-1; No Copyright; Avail: CASI; [A02](#), Hardcopy

A method is presented for determining absolute intracranial pressure (ICP) in a patient. Skull expansion is monitored while changes in ICP are induced. The patient's blood pressure is measured when skull expansion is approximately zero. The measured blood pressure is indicative of a reference ICP value. Subsequently, the method causes a known change in ICP and measured the change in skull expansion associated therewith. The absolute ICP is a function of the reference ICP value, the known change in ICP and its associated change in skull expansion; and a measured change in skull expansion.

Author

*Medical Equipment; Pressure Measurement; Intracranial Pressure; Skull; Nonintrusive Measurement*



## COMPUTER PROGRAMMING AND SOFTWARE

Includes software engineering, computer programs, routines, algorithms, and specific applications, e.g., CAD/CAM. For computer software applied to specific applications, see also the associated category.

**20040081250** NASA Ames Research Center, Moffett Field, CA, USA

### System, Method and Apparatus for Discovering Phrases in a Database

McGreevy, Michael W., Inventor; April 13, 2004; 75 pp.; In English

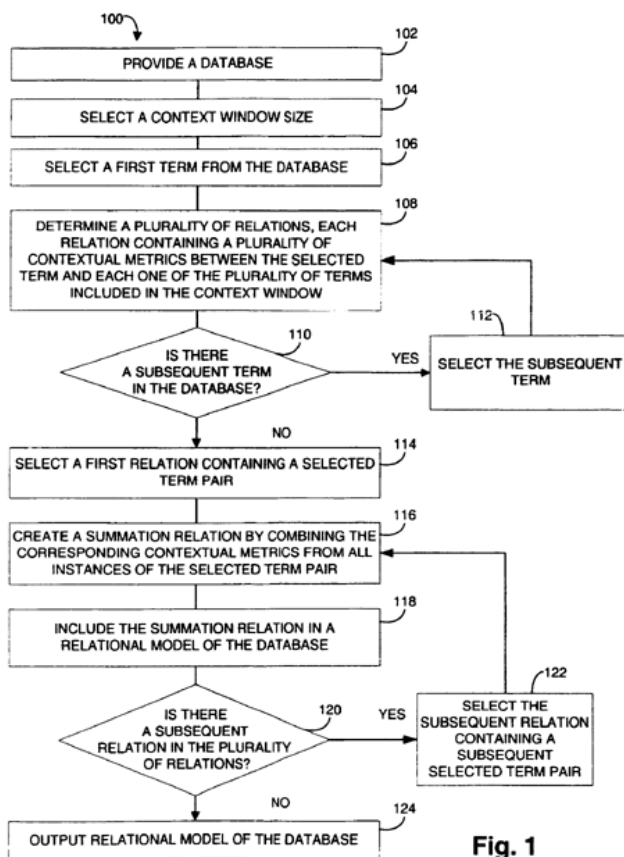
Patent Info.: Filed 2 Mar. 2001; US-Patent-6,721,728; US-Patent-Appl-SN-800310; NASA-Case-ARC-14515-1; No Copyright; Avail: CASI; [A04](#), Hardcopy

A phrase discovery is a method of identifying sequences of terms in a database. First, a selection of one or more relevant sequences of terms, such as relevant text, is provided. Next, several shorter sequences of terms, such as phrases, are extracted from the provided relevant sequences of terms. The extracted sequences of terms are then reduced through a culling process. A gathering process then emphasizes the more relevant of the extracted and culled sequences of terms and de-emphasizes the more generic of the extracted and culled sequences of terms. The gathering process can also include iteratively retrieving additional selections of relevant sequences (e.g., text), extracting and culling additional sequences of terms (e.g., phrases).

emphasizing and de-emphasizing extracted and culled sequences of terms and accumulating all gathered sequences of terms. The resulting gathered sequences of terms are then output.

Author

*Data Bases; Identifying; Texts; Computer Programs*



**Fig. 1**

**20040121003** NASA Marshall Space Flight Center, Huntsville, AL, USA

### Generalized Fluid System Simulation Program

Majumdar, Alok Kumar, Inventor; Bailey, John W., Inventor; Schallhorn, Paul Alan, Inventor; Steadman, Todd E., Inventor; June 08, 2004; 35 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 7 May 1999; US-Patent-6,748,349; US-Patent-Appl-SN-313576; NASA-Case-MFS-31303-1; No Copyright; Avail: CASI; A03, Hardcopy

A general purpose program implemented on a computer analyzes steady state and transient flow in a complex fluid network, modeling phase changes, compressibility, mixture thermodynamics and external body forces such as gravity and centrifugal force. A preprocessor provides for the inter- active development of a fluid network simulation having nodes and branches. Mass, energy, and specie conservation equations are solved at the nodes, and momentum conservation equations are solved in the branches. Contained herein are subroutines for computing 'real fluid' thermodynamic and thermophysical properties for 12 fluids, and a number of different source options are provided for modeling momentum sources or sinks in the branches. The system of equations describing the fluid network is solved by a hybrid numerical method that is a combination of the Newton-Raphson and successive substitution methods. Application and verification of this invention are provided through an example problem, which demonstrates that the predictions of the present invention compare most reasonably with test data.

Author

*Computer Programs; Fluid Flow; Computerized Simulation; Gravitation; Centrifugal Force; Thermodynamic Properties*

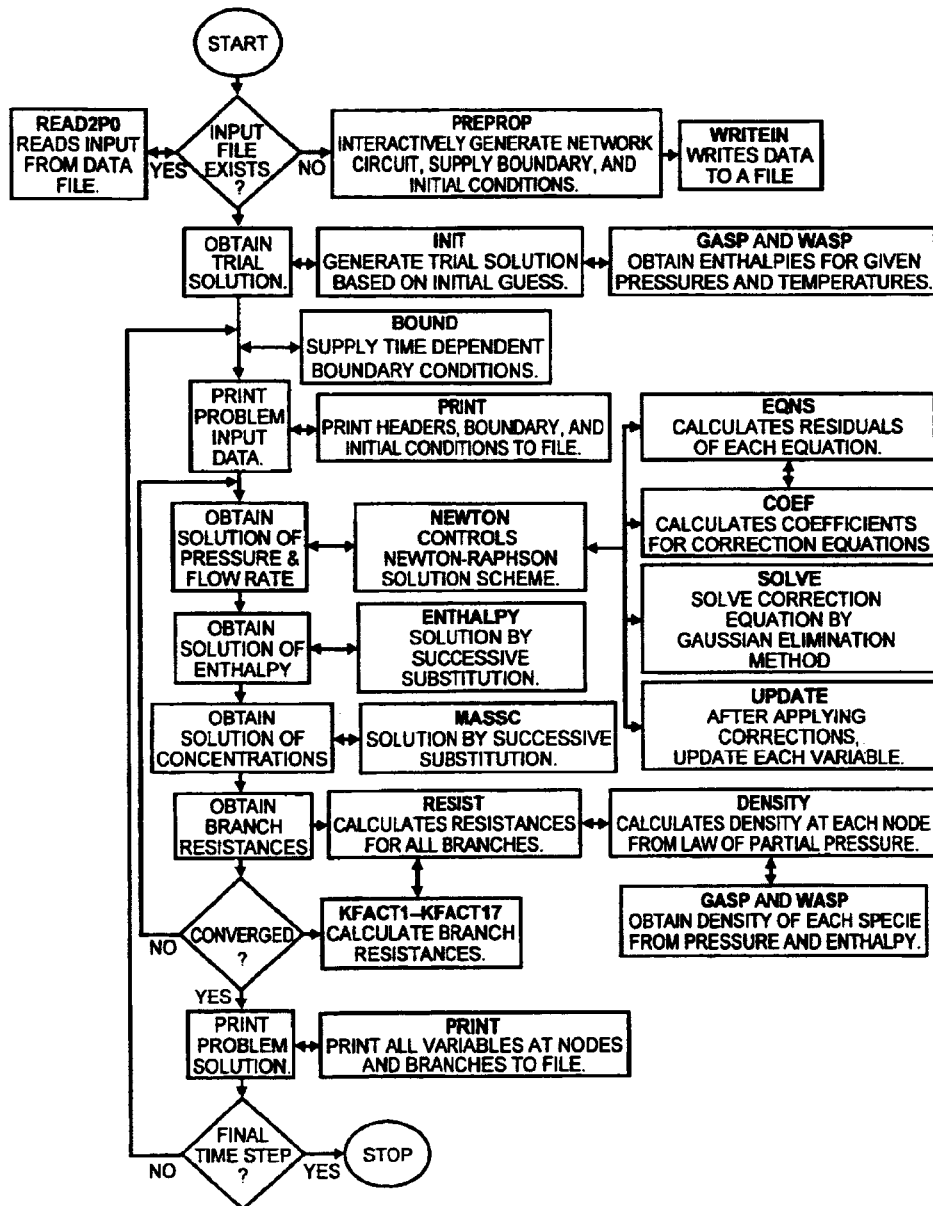


FIG. 2

## 74 OPTICS

Includes light phenomena and the theory of optical devices; for specific optical devices see also *35 Instrumentation and Photography*. For lasers see *36 Lasers and Masers*.

**20040120996** NASA Marshall Space Flight Center, Huntsville, AL, USA

### Magnetic Symbology Reader

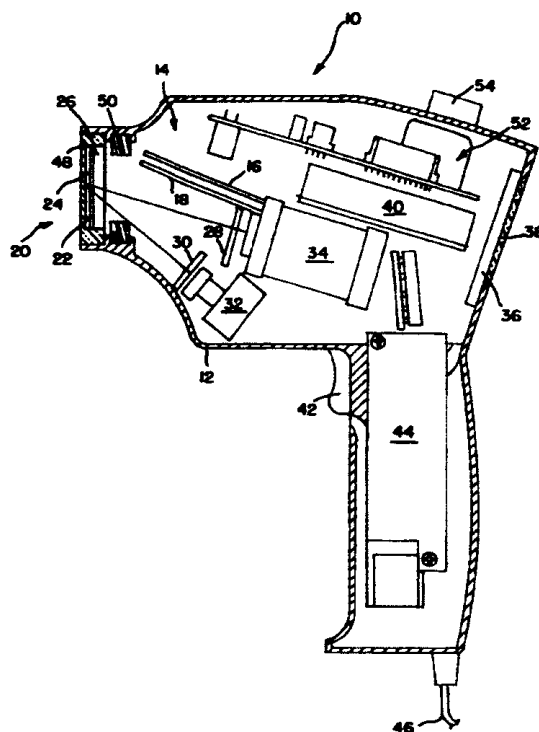
Schramm, Harry F., Inventor; Shih, William C. L., Inventor; Fitzpatrick, Gerald L., Inventor; Knisely, Craig, Inventor; June 08, 2004; 5 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 5 Aug. 2002; US-Patent-6,745,942; US-Patent-Appl-SN-214482; NASA-Case-MFS-31768-1; No Copyright; Avail: CASI; A01, Hardcopy

A magnetic symbology reader has a housing containing a polarized light source which directs light though a magneto-optic sensor onto a reflector which reflects light least one analyzer and into at least one camera. A view finder allows

the user to monitor the image on the sensor as seen by a viewfinder camera while a processor is coupled to possibly a second camera so that when an image is detected, the image from the camera may be processed by the processor to output information associated with the symbol to an external source. The analyzer and polarized light source provide contrast in the images detected by the sensor. A bias/erase coil located about the magneto-optic sensor can enhance or erase images on the sensor. Official Gazette of the U.S. Patent and Trademark Office

*Magneto-Optics; Readers; Symbols; Sensors*



**20040191320** Naval Research Lab., USA

#### **Method for Fabricating Metallic Mesh Infrared Optics**

[2003]; 51 pp.; In English

Contract(s)/Grant(s): NAG5-7394; Navy-Case-84985; No Copyright; Avail: CASI; [A04](#), Hardcopy

The purpose of the invention is to design and fabricate precise optical devices that can be used to filter or otherwise process infrared radiation. The improved precision of this new monolithic fabrication process, the clever designs - in the metal lattice geometries, the multiple layering of different geometries to comprise unique sets, the precise irregular, sub-wavelength spacing of these layers, and the precise testing of prototypes and intermediate stages - as well as the reliable modeling all enable the construction of filters that operate at shorter wavelengths, and increase the yield of each fabrication run while decreasing the fabrication time and cost.

Author

*Optical Equipment; Mesh; Optical Filters; Metals; Fabrication; Optical Materials; Infrared Radiation*

## **76**

### **SOLID-STATE PHYSICS**

Includes condensed matter physics, crystallography, and superconductivity. For related information see also *33 Electronics and Electrical Engineering*; and *36 Lasers and Masers*.

**20040120994** NASA Glenn Research Center, Cleveland, OH, USA

#### **Lateral Movement of Screw Dislocations During Homoepitaxial Growth and Devices Yielded Therefrom Free of the Detrimental Effects of Screw Dislocations**

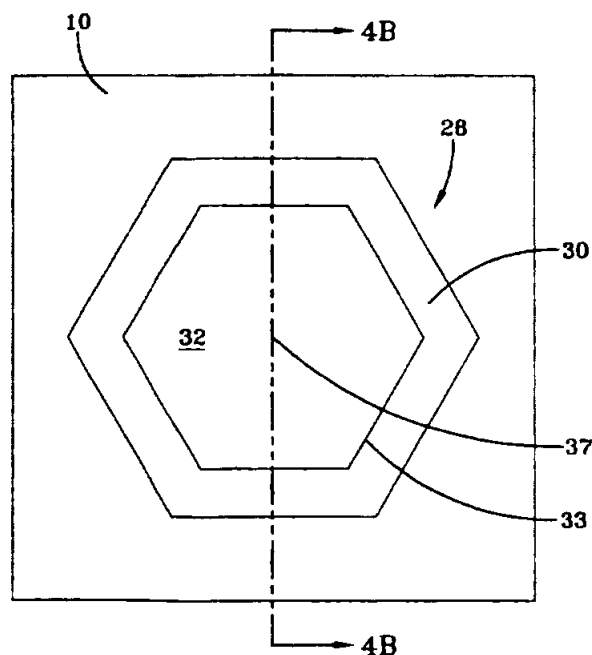
Neudeck, Philip G., Inventor; Powell, J. Anthony, Inventor; August 31, 2004; 37 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 10 Oct. 2002; US-Patent-6,783,592; US-Patent-Appl-SN-268749; NASA-Case-LEW-17237-1; No Copyright; Avail: CASI; [A03](#), Hardcopy

The present invention is related to a method that enables and improves wide bandgap homoepitaxial layers to be grown on axis single crystal substrates, particularly SiC. The lateral positions of the screw dislocations in epitaxial layers are predetermined instead of random, which allows devices to be reproducibly patterned to avoid performance degrading crystal defects normally created by screw dislocations.

Official Gazette of the U.S. Patent and Trademark Office

*Crystal Growth; Epitaxy; Screw Dislocations; Single Crystals*



# Subject Term Index

## ACCELEROMETERS

Multi-Functional, Micro Electromechanical Silicon Carbide Accelerometer – 5

## ALPHA PARTICLES

Very High Efficiency, Miniaturized, Long-Lived Alpha Particle Power Source Using Diamond Devices for Extreme Space Environments – 7

## ATOMIZERS

Method for Forming MEMS-Based Spinning Nozzle – 2

## BAGGAGE

Article Screening System – 1

## BARRIER LAYERS

Multilayer Article Characterized by Low Coefficient of Thermal Expansion Outer Layer – 3

## BIOINSTRUMENTATION

Retinal Light Processing Using Carbon Nanotubes – 13

## BIOLOGY

Preservation of Liquid Biological Samples – 17

## CARBON NANOTUBES

Retinal Light Processing Using Carbon Nanotubes – 13

Single-element Electron-transfer Optical Detector System – 13

## CATALYSTS

Process for Coating Substrates with Catalytic Materials – 4

## CENTRIFUGAL FORCE

Generalized Fluid System Simulation Program – 20

## CLAMPS

Force-Measuring Clamp – 15

## COATINGS

Dual Use Corrosion Inhibitor and Penetrant for Anomaly Detection in Neutron/X Radiography – 3

## COATING

Process for Coating Substrates with Catalytic Materials – 4

## COMPRESSION WAVES

Method and Apparatus for Determining Changes in Intracranial Pressure Utilizing Measurement of the Circumferential Expansion or Contraction of a Patient's Skull – 17

## COMPUTER PROGRAMS

Generalized Fluid System Simulation Program – 20

System, Method and Apparatus for Discovering Phrases in a Database – 19

## COMPUTERIZED SIMULATION

Generalized Fluid System Simulation Program – 20

## CORROSION PREVENTION

Dual Use Corrosion Inhibitor and Penetrant for Anomaly Detection in Neutron/X Radiography – 3

## CRYOGENICS

Methods of Testing Thermal Insulation and Associated Test Apparatus – 16

## CRYSTAL GROWTH

Lateral Movement of Screw Dislocations During Homoepitaxial Growth and Devices Yielded Therefrom Free of the Detrimental Effects of Screw Dislocations – 22

## DATA BASES

System, Method and Apparatus for Discovering Phrases in a Database – 19

## DIAGRAMS

Auto-Adjustable Tool for Self-Reacting and Conventional Friction Stir Welding – 15

## DIAMOND FILMS

Very High Efficiency, Miniaturized, Long-Lived Alpha Particle Power Source Using Diamond Devices for Extreme Space Environments – 7

## ELECTRIC POWER SUPPLIES

Very High Efficiency, Miniaturized, Long-Lived Alpha Particle Power Source Using Diamond Devices for Extreme Space Environments – 7

## ELECTROLYTIC CELLS

Cross Cell Sandwich Core – 7

## ELECTRON COUNTERS

Single-element Electron-transfer Optical Detector System – 13

## ELECTRON TRANSFER

Multi-Element Electron-Transfer Optical Detector System – 9

Single-element Electron-transfer Optical Detector System – 13

## ENHANCED VISION

Retinal Light Processing Using Carbon Nanotubes – 13

## EPITAXY

Lateral Movement of Screw Dislocations During Homoepitaxial Growth and Devices Yielded Therefrom Free of the Detrimental Effects of Screw Dislocations – 22

## FABRICATION

Gas Sensors Using SiC Semiconductors and Method of Fabrication Thereof – 14

Method for Fabricating Metallic Mesh Infrared Optics – 22

Method for Forming MEMS-Based Spinning Nozzle – 2

## FERROMAGNETIC MATERIALS

Ferromagnetic Conducting Lignosulfonic Acid-doped Polyaniline Nanocomposites – 4

## FLUID FLOW

Generalized Fluid System Simulation Program – 20

## FRICTION STIR WELDING

Auto-Adjustable Tool for Self-Reacting and Conventional Friction Stir Welding – 15

## FUEL INJECTION

Method for Forming MEMS-Based Spinning Nozzle – 2

## FUEL SPRAYS

Method for Forming MEMS-Based Spinning Nozzle – 2

## FULLERENES

Protective Fullerene (C60) Packaging System for Microelectromechanical Systems Applications – 6

## GAS DETECTORS

Gas Sensors Using SiC Semiconductors and Method of Fabrication Thereof – 14

## GRAVITATION

Generalized Fluid System Simulation Program – 20

## HEALTH

Thermodynamic Pressure/Temperature Transducer Health Check – 11

## HEART

Passive Fetal Heart Monitoring System – 18

## HEAT TRANSFER

Apparatus and Method for Thermal Performance Testing of Pipelines and Piping Systems – 8

## HETERODYNING

Heterodyne Interferometer with a Phase Modulated Source – 12

## IDENTIFYING

System, Method and Apparatus for Discovering Phrases in a Database – 19

## IMAGE PROCESSING

Video Image Tracking Engine – 14

## IMAGING TECHNIQUES

Article Screening System – 1

## INFRARED RADIATION

Method for Fabricating Metallic Mesh Infrared Optics – 22

## INTERFEROMETERS

Heterodyne Interferometer with a Phase Modulated Source – 12

## **INTRACRANIAL PRESSURE**

Method and Apparatus for Determining Changes in Intracranial Pressure Utilizing Measurement of the Circumferential Expansion or Contraction of a Patient's Skull – 17

Method and Apparatus for Non-Invasive Measurement of Changes in Intracranial Pressure – 10

Non-Invasive Method of Determining Absolute Intracranial Pressure – 19

## **LIQUIDS**

Preservation of Liquid Biological Samples – 17

## **LITHIUM BATTERIES**

Method for Manufacturing Thin-film Lithium Microbatteries – 6

## **MAGNETO-OPTICS**

Magnetic Symbology Reader – 21

## **MANUFACTURING**

Method for Manufacturing Thin-film Lithium Microbatteries – 6

Multi-Functional, Micro Electromechanical Silicon Carbide Accelerometer – 5

Rare Earth Optical Temperature Sensor – 11

## **MEDICAL EQUIPMENT**

Method and Apparatus for Non-Invasive Measurement of Changes in Intracranial Pressure – 10

Non-Invasive Method of Determining Absolute Intracranial Pressure – 19

## **MESH**

Method for Fabricating Metallic Mesh Infrared Optics – 22

## **METALS**

Method for Fabricating Metallic Mesh Infrared Optics – 22

## **MICROELECTROMECHANICAL SYSTEMS**

Method for Forming MEMS-Based Spinning Nozzle – 2

Multi-Functional, Micro Electromechanical Silicon Carbide Accelerometer – 5

Protective Fullerene (C60) Packaging System for Microelectromechanical Systems Applications – 6

## **MONITORS**

Passive Fetal Heart Monitoring System – 18

Self-Activating System and Method for Alerting When an Object or a Person is Left Unattended – 9

## **NANOCOMPOSITES**

Ferromagnetic Conducting Lignosulfonic Acid-doped Polyaniline Nanocomposites – 4

## **NONDESTRUCTIVE TESTS**

Synchronized Electronic Shutter System and Method for Thermal Nondestructive Evaluation – 5

## **NONINTRUSIVE MEASUREMENT**

Method and Apparatus for Non-Invasive Measurement of Changes in Intracranial Pressure – 10

Non-Invasive Method of Determining Absolute Intracranial Pressure – 19

## **OPTICAL EQUIPMENT**

Method for Fabricating Metallic Mesh Infrared Optics – 22

Multi-Element Electron-Transfer Optical Detector System – 9

## **OPTICAL FILTERS**

Method for Fabricating Metallic Mesh Infrared Optics – 22

## **OPTICAL MATERIALS**

Method for Fabricating Metallic Mesh Infrared Optics – 22

## **OPTICAL MEASURING INSTRUMENTS**

Rare Earth Optical Temperature Sensor – 11

## **PACKAGING**

Protective Fullerene (C60) Packaging System for Microelectromechanical Systems Applications – 6

## **PENETRANTS**

Dual Use Corrosion Inhibitor and Penetrant for Anomaly Detection in Neutron/X Radiography – 3

## **PERFORMANCE TESTS**

Apparatus and Method for Thermal Performance Testing of Pipelines and Piping Systems – 8

## **PHASE MODULATION**

Heterodyne Interferometer with a Phase Modulated Source – 12

## **PIPELINES**

Apparatus and Method for Thermal Performance Testing of Pipelines and Piping Systems – 8

## **POLYIMIDES**

Heat, Moisture and Chemical Resistant Polyimide Compositions and Methods for Making and Using Them – 2

## **PRESERVING**

Preservation of Liquid Biological Samples – 17

## **PRESSURE MEASUREMENT**

Method and Apparatus for Determining Changes in Intracranial Pressure Utilizing Measurement of the Circumferential Expansion or Contraction of a Patient's Skull – 17

Method and Apparatus for Non-Invasive Measurement of Changes in Intracranial Pressure – 10

Non-Invasive Method of Determining Absolute Intracranial Pressure – 19

## **PRESSURE SENSORS**

Thermodynamic Pressure/Temperature Transducer Health Check – 11

## **RADIATION DETECTORS**

Multi-Element Electron-Transfer Optical Detector System – 9

## **RADIOGRAPHY**

Dual Use Corrosion Inhibitor and Penetrant for Anomaly Detection in Neutron/X Radiography – 3

## **RARE EARTH ELEMENTS**

Rare Earth Optical Temperature Sensor – 11

## **READERS**

Magnetic Symbology Reader – 21

## **RETINA**

Retinal Light Processing Using Carbon Nanotubes – 13

## **SAFETY**

Self-Activating System and Method for Alerting When an Object or a Person is Left Unattended – 9

## **SAMPLES**

Preservation of Liquid Biological Samples – 17

## **SCREW DISLOCATIONS**

Lateral Movement of Screw Dislocations During Homoepitaxial Growth and Devices Yielded Therefrom Free of the Detrimental Effects of Screw Dislocations – 22

## **SEMICONDUCTORS (MATERIALS)**

Gas Sensors Using SiC Semiconductors and Method of Fabrication Thereof – 14

## **SENSORS**

Magnetic Symbology Reader – 21

## **SHUTTERS**

Synchronized Electronic Shutter System and Method for Thermal Nondestructive Evaluation – 5

## **SIGNAL TRANSMISSION**

Passive Fetal Heart Monitoring System – 18

## **SILICATES**

Multilayer Article Characterized by Low Coefficient of Thermal Expansion Outer Layer – 3

## **SILICON CARBIDES**

Gas Sensors Using SiC Semiconductors and Method of Fabrication Thereof – 14

Multi-Functional, Micro Electromechanical Silicon Carbide Accelerometer – 5

## **SINGLE CRYSTALS**

Lateral Movement of Screw Dislocations During Homoepitaxial Growth and Devices Yielded Therefrom Free of the Detrimental Effects of Screw Dislocations – 22

## **SKULL**

Non-Invasive Method of Determining Absolute Intracranial Pressure – 19

## **SPRAY NOZZLES**

Method for Forming MEMS-Based Spinning Nozzle – 2

## **STEREOSCOPY**

Article Screening System – 1

## **STRAIN GAGES**

Force-Measuring Clamp – 15

**SUBSTRATES**

Process for Coating Substrates with Catalytic Materials – [4](#)

**SULFONIC ACID**

Ferromagnetic Conducting Lignosulfonic Acid-doped Polyaniline Nanocomposites – [4](#)

**SYMBOLS**

Magnetic Symbolology Reader – [21](#)

**SYNCHRONIZERS**

Synchronized Electronic Shutter System and Method for Thermal Nondestructive Evaluation – [5](#)

**SYNTHESIS (CHEMISTRY)**

Heat, Moisture and Chemical Resistant Polyimide Compositions and Methods for Making and Using Them – [2](#)

**TEMPERATURE SENSORS**

Rare Earth Optical Temperature Sensor – [11](#)

**TEXTS**

System, Method and Apparatus for Discovering Phrases in a Database – [19](#)

**THERMAL ANALYSIS**

Synchronized Electronic Shutter System and Method for Thermal Nondestructive Evaluation – [5](#)

**THERMAL EXPANSION**

Multilayer Article Characterized by Low Coefficient of Thermal Expansion Outer Layer – [3](#)

**THERMAL INSULATION**

Methods of Testing Thermal Insulation and Associated Test Apparatus – [16](#)

**THERMODYNAMIC PROPERTIES**

Generalized Fluid System Simulation Program – [20](#)

**THERMODYNAMICS**

Thermodynamic Pressure/Temperature Transducer Health Check – [11](#)

**THERMOMETERS**

Thermodynamic Pressure/Temperature Transducer Health Check – [11](#)

**THIN FILMS**

Method for Manufacturing Thin-film Lithium Microbatteries – [6](#)

**VIDEO DATA**

Video Image Tracking Engine – [14](#)

**VIDEO EQUIPMENT**

Video Image Tracking Engine – [14](#)

**WALLS**

Cross Cell Sandwich Core – [7](#)

**WARNING SYSTEMS**

Self-Activating System and Method for Alerting When an Object or a Person is Left Unattended – [9](#)

**X RAY IMAGERY**

Article Screening System – [1](#)

**ZIRCONIUM OXIDES**

Multilayer Article Characterized by Low Coefficient of Thermal Expansion Outer Layer – [3](#)

# Personal Author Index

## **Augustynowicz, Stanislaw D.**

Apparatus and Method for Thermal Performance Testing of Pipelines and Piping Systems – 8

## **Bailey, John W.**

Generalized Fluid System Simulation Program – 20

## **Berry, Brian**

Ferromagnetic Conducting Lignosulfonic Acid-doped Polyaniline Nanocomposites – 4

## **Book, Michael L.**

Video Image Tracking Engine – 14

## **Bryan, Thomas C.**

Video Image Tracking Engine – 14

## **Bryant, Timothy D.**

Passive Fetal Heart Monitoring System – 18

## **Bugga, Ratnakumar V.**

Method for Manufacturing Thin-film Lithium Microbatteries – 6

## **Cantrell, John H., Jr.**

Method and Apparatus for Determining Changes in Intracranial Pressure Utilizing Measurement of the Circumferential Expansion or Contraction of a Patient's Skull – 17

Method and Apparatus for Non-Invasive Measurement of Changes in Intracranial Pressure – 10

Non-Invasive Method of Determining Absolute Intracranial Pressure – 19

## **Carter, Robert W.**

Auto-Adjustable Tool for Self-Reacting and Conventional Friction Stir Welding – 15

## **Chubb, Donald L.**

Rare Earth Optical Temperature Sensor – 11

## **Deyoe, Richard T.**

Thermodynamic Pressure/Temperature Transducer Health Check – 11

## **Dubovitsky, Serge**

Heterodyne Interferometer with a Phase Modulated Source – 12

## **Eckhoff, Anthony**

Thermodynamic Pressure/Temperature Transducer Health Check – 11

## **Edwards, William Christopher**

Self-Activating System and Method for Alerting When an Object or a Person is Left Unattended – 9

## **Fernandez, Kenneth R.**

Article Screening System – 1

## **Fesmire, James E.**

Apparatus and Method for Thermal Performance Testing of Pipelines and Piping Systems – 8

## **Fishman, Harvey**

Retinal Light Processing Using Carbon Nanotubes – 13

## **Fitzpatrick, Gerald L.**

Magnetic Symbology Reader – 21

## **Fleuriel, Jean-Pierre**

Very High Efficiency, Miniaturized, Long-Lived Alpha Particle Power Source Using Diamond Devices for Extreme Space Environments – 7

## **Ford, Donald B.**

Cross Cell Sandwich Core – 7

## **Hall, Phillip B.**

Dual Use Corrosion Inhibitor and Penetrant for Anomaly Detection in Neutron/X Radiography – 3

## **Hargens, Alan E.**

Non-Invasive Method of Determining Absolute Intracranial Pressure – 19

## **Holloway, Nancy M. H.**

Passive Fetal Heart Monitoring System – 18

## **Howard, Richard T.**

Video Image Tracking Engine – 14

## **Hunter, Gary W.**

Gas Sensors Using SiC Semiconductors and Method of Fabrication Thereof – 14

## **Immer, Christopher D.**

Thermodynamic Pressure/Temperature Transducer Health Check – 11

## **Jenkins, Phillip**

Rare Earth Optical Temperature Sensor – 11

## **Jordan, Jeffrey D.**

Multi-Element Electron-Transfer Optical Detector System – 9

Single-element Electron-transfer Optical Detector System – 13

## **Klelin, Ric J.**

Process for Coating Substrates with Catalytic Materials – 4

## **Knisely, Craig**

Magnetic Symbology Reader – 21

## **Kolawa, Elizabeth A.**

Very High Efficiency, Miniaturized, Long-Lived Alpha Particle Power Source Using Diamond Devices for Extreme Space Environments – 7

## **Lee, Kang N.**

Multilayer Article Characterized by Low Coefficient of Thermal Expansion Outer Layer – 3

## **Leng, Theodore**

Retinal Light Processing Using Carbon Nanotubes – 13

## **Loftus, David J.**

Retinal Light Processing Using Carbon Nanotubes – 13

## **Mack, Terry L.**

Self-Activating System and Method for Alerting When an Object or a Person is Left Unattended – 9

## **Majumdar, Alok Kumar**

Generalized Fluid System Simulation Program – 20

## **McGreevy, Michael W.**

System, Method and Apparatus for Discovering Phrases in a Database – 19

## **Medelius, Pedro J.**

Thermodynamic Pressure/Temperature Transducer Health Check – 11

## **Modlin, Edward A.**

Self-Activating System and Method for Alerting When an Object or a Person is Left Unattended – 9

## **Nagy, Zoltan F.**

Apparatus and Method for Thermal Performance Testing of Pipelines and Piping Systems – 8

## **Neudeck, Philip G.**

Gas Sensors Using SiC Semiconductors and Method of Fabrication Thereof – 14

Lateral Movement of Screw Dislocations During Homoepitaxial Growth and Devices Yielded Therefrom Free of the Detrimental Effects of Screw Dislocations – 22

## **Nimmagudda, Ramalingeshwara**

Preservation of Liquid Biological Samples – 17

## **Novak, Howard L.**

Dual Use Corrosion Inhibitor and Penetrant for Anomaly Detection in Neutron/X Radiography – 3

## **Nunnelee, Mark**

Force-Measuring Clamp – 15

## **Okojie, Robert S.**

Method for Forming MEMS-Based Spinning Nozzle – 2

Multi-Functional, Micro Electromechanical Silicon Carbide Accelerometer – 5

## **Olivas, John D.**

Protective Fullerene (C60) Packaging System for Microelectromechanical Systems Applications – 6

## **Patel, Jagdishbhai U.**

Very High Efficiency, Miniaturized, Long-Lived Alpha Particle Power Source Using Diamond Devices for Extreme Space Environments – 7

## **Pater, Ruth H.**

Heat, Moisture and Chemical Resistant Polyimide Compositions and Methods for Making and Using Them – 2

**Powell, J. Anthony**

Lateral Movement of Screw Dislocations During Homoepitaxial Growth and Devices Yielded Therefrom Free of the Detrimental Effects of Screw Dislocations – 22

**Putcha, Lakshmi**

Preservation of Liquid Biological Samples – 17

**Schallhorn, Paul Alan**

Generalized Fluid System Simulation Program – 20

**Schramm, Harry F.**

Magnetic Symbolology Reader – 21

**Schryer, David R.**

Process for Coating Substrates with Catalytic Materials – 4

**Shih, William C. L.**

Magnetic Symbolology Reader – 21

**Starr, Stanley O.**

Thermodynamic Pressure/Temperature Transducer Health Check – 11

**Steadman, Todd E.**

Generalized Fluid System Simulation Program – 20

**Upchurch, Billy T.**

Process for Coating Substrates with Catalytic Materials – 4

**Viswansthan, Tito**

Ferromagnetic Conducting Lignosulfonic Acid-doped Polyaniline Nanocomposites – 4

**West, William C.**

Method for Manufacturing Thin-film Lithium Microbatteries – 6

**Whitacre, Jay F.**

Method for Manufacturing Thin-film Lithium Microbatteries – 6

**Winfree, William P.**

Synchronized Electronic Shutter System and Method for Thermal Nondestructive Evaluation – 5

**Wynkoop, Mark W.**

Passive Fetal Heart Monitoring System – 18

**Yos, William T.**

Method and Apparatus for Determining Changes in Intracranial Pressure Utilizing Measurement of the Circumferential Expansion or Contraction of a Patient's Skull – 17

**Yost, William T.**

Method and Apparatus for Non-Invasive Measurement of Changes in Intracranial Pressure – 10

Non-Invasive Method of Determining Absolute Intracranial Pressure – 19

**Zalameda, Joseph N.**

Synchronized Electronic Shutter System and Method for Thermal Nondestructive Evaluation – 5

**Zuckerwar, Allan J.**

Passive Fetal Heart Monitoring System – 18

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